Status for the implementation of DVB-T in the CEPT area
October 2005

Introduction

The ITU Regional Radiocommunications Conference RRC-06 shall establish a new agreement and associated frequency plans, including a new plan for terrestrial digital television (DVB-T) in the frequency bands 174 - 230 MHz (Band III) and 470 - 862 MHz (Bands IV/V).

In preparation for the RRC-06 the CEPT has decided to follow the implementation of DVB-T. A significant number of CEPT countries have made a commitment to DVB-T with pilot or test transmissions taking place and planning studies under way for nation-wide coverage. Furthermore, a number of countries already have operational transmissions.

In order to inform the WG RRC-06 on the implementation of DVB-T the ERO is maintaining this overview document. It consists of a table with figures on frequencies, transmitters, receivers and population coverage. Additional information is provided in the text following the table in the form of notes for each country.

Please note that the map indicates the current status of implementation of DVB-T in CEPT countries and not the actual coverage.

An updated overview is to be presented at each WG RRC-06 meeting.

Last update: 06 October 2005.

Next WG RRC-06 meeting: 31 January – 02 February 2006

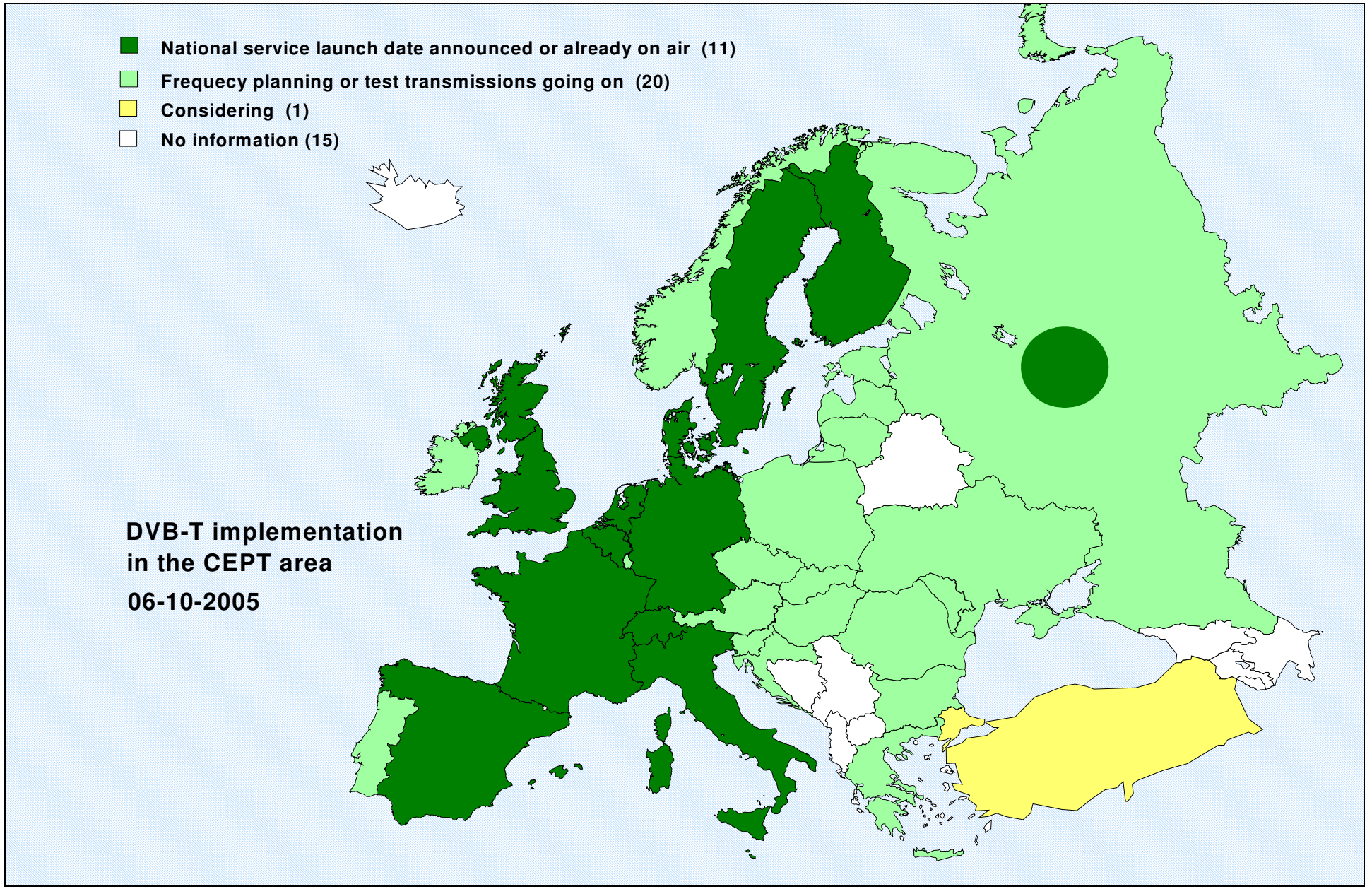


Figure 1: DVB-T status in Europe

DVB-T implementation progress overview

Country	Co-ordination in progress	Number of transmitters (not number of stations)				Percentage of households that can already, or are expected in the near future to, receive the quoted number of multiplexes						Number of DVB-T receivers in use (sold or rented)	Date of last update
		In operation		Total after one year from now									
(ITU Code)	(yes / no)	e.r.p. < 1kW	e.r.p. ≥ 1kW	e.r.p. < 1kW	e.r.p. ≥ 1kW	1 MPX	2 MPX	3 MPX	4 MPX	5 MPX	6 MPX or more		
AUT	Yes	-	2	-	-	5	-	-	-	-	-	200	10-02-05
BEL	Yes	1	9	1	12	80	40	0	0			10000	06-10-2005
BIH	No	0	0	0	0							0	17-10-03
BUL	Yes	1	1	7		26	12					unknown	06-10-2005
CZE	Yes		5(1)			>10	>10					~2000	06-10-2005
D	Yes	19	208	29	298							> 3.000.000	29-09-2005
DNK	Yes	0(1)	2(1)	0(1)	17(1)	>90						>15000	29-09-2005
EST	Yes		1		2	40							27-09-2005
F	Yes		17										03-10-2005
FIN	Yes	77	97	120	100	99	99	85				> 500 000	03-10-2005
GRC	No					15							10-06-03
HNG	Yes	2(1)	3(1)	2(1)	3(1)								06-10-2005
HOL	Yes	25	96		136	25	25	25	25	25			06-10-2005
HRV	Yes		3(1)		7	40							28-09-2005
I	Yes	700	900	800	1000	60	50	25	10	5		>1.000.000	04-10-2005
IRL	Yes	-	-	-	-	-	-	-	-	-	-	-	26-09-2005
LTU	Yes	-	(1)	-	≥1	25	-	-	-	-	-	>10	06-10-2005
LVA	Yes	1(1)	-	-	-	-	-	-	-	-	-	~ 2500	06-10-2005
LUX	yes		3		4	-	-	-	-	-	-	-	06-10-2005
MDA	Yes	-	2(1)	-	2	10	-	-	-	-	-	3	17-10-03
MLT	Yes		5	~8	~56						100	n/a	23-09-2005
NOR	Yes		5 (1)		6	30	22						06-10-2005
POL	Yes	1	4(1)	1	16	~21	~16					> 20 000	27-09-2005
POR	Yes	0	0	0	0								06-10-2005
ROU	Yes												16-09-03
RUS	Yes	1	4	1	5								06-10-2005
S	Yes	34	249	~80	~277	90 (98)	90 (98)	90 (98)	90 (98)	50		550,000	04-10-2005
SUI	Yes	114	13	201	21	20			5			15000	26-09-2005
SVK	Yes		3 (1)		7 (1)	17						5500	04-10-2005
SVN	Yes	-	2(1)	-	2(1)	15	-	-	-	-	-	20	06-10-2005
TUR	No												28-09-99
UK	Yes	231	267	231	267	81	80	78	79	76	74	5,180,000	30-09-2005
UKR	Yes		1		1	< 1							06-10-2005

(1): Test transmission

Note: No information is available for those countries that are not included in the table above.

DVB-T implementation progress overview

Notes to the table

This overview contains a table presenting the actual situation in individual countries.

In the table the columns under the heading “Number of transmitters...” should be understood as the number of physical transmitters (transmitter equipment) already in operation or expected to start within the next year (the number given could be more than 1 per transmitting station).

The columns under the heading “Percentage of households that can receive...” should be interpreted as follows:

Max. 1 MPX: Percentage of the total number of households in the country that can, or are expected to, receive at least one multiplex in the near future.

Max. 2 MPX: Percentage of the total number of households in the country that can, or are expected to, receive at least two multiplexes in the near future.

Max. 3 MPX: Percentage of the total number of households in the country that can, or are expected to, receive at least three multiplexes in the near future - and so on.

Austria (10-02-2005)

Within the Austrian Broadcasting Corporation (ORF) a feasibility study was carried out investigating the possibility of introducing DVB-T by using MFNs and small SFNs. Moreover, field trials were carried out with three transmitters, two of them forming a small gap-filler SFN.

At the end of January 2002 the Digital Platform Austria (DPA) was established with the aim to focus the efforts to start with the implementation of DVB-T. The first report of DPA was sent to parliament for information at the beginning of 2003. During 2003 the strategy of how to introduce DVB-T and how to switch over from analogue to digital TV transmissions including a time table of the action plan has been developed and published by the Regulatory Authority.

Channels for DVB-T, in particular channels above 60, are in the process of co-ordination. The aim is to provide in the short time range coverage for DVB-T in the large cities and areas with a high density of population. It is envisaged to have a short simulcast of analogue and digital transmissions.

The public tender for regular transmissions is scheduled for May 2005.

Between April and July 2004 comprehensive test transmissions were carried out in Graz, including additional data transmissions and in particular interactive MHP applications. More than 150 MHP boxes were distributed to certain households, which agreed to take part in an accompanying market research. The final report of the results is available since the end of 2004.

Belgium (06-10-05)

The planning and frequency co-ordination for DVB-T is going on. As there is a very high cable penetration and hardly any outdoor receiving aerials, Belgium is planning for portable indoor reception and will use SFN networks with the 8K system and the highest guard interval. Interactive and data services will be key issues for DVBT. The choice of the return channel for the portable terminals is still under study.

In the Flemish Community in 2002 the research project “Digital Home Platform” (DHP) has been created. Via 4 DVB-T transmitters in the Antwerp region (and ADSL as return channel) new interactive services and applications were on air. A limited number of carefully selected households got a powerful set-top-box with a large hard disk. The DHP project focused on technology, the development of new applications, the PVR functions and the acceptance by the users. The DHP research project finished on June 30th 2003 and the acquired experience is now used in a similar project on digital cable television, called 'Flanders Interactive'.

From the first of July 2003 regular DVB-T transmissions started with 1 multiplex in the Antwerp region. In May 2004 the DVB-T network was extended to cover the whole area of Flanders with one multiplex for outdoor reception. In some large towns portable indoor reception is provided.

As Flanders is completely covered by DVB-T, the switch-off of the analogue terrestrial transmitters is under consideration. A switch–off in 2010 may be realistic.

In the French Community 2 DVB-T transmitters in the Brussels area are in operation. It is planned to extend gradually this network. The whole French Community will be covered end 2007.

The availability of (cheap) receivers with good behaviour in large SFN networks will be a crucial factor in the development of DVB-T in Belgium. Agoria, the Belgian sector federation of the technology industry, has set up a working group with representatives of broadcasters, industry and network operators to define technical parameters for a combined DVB-T/DVB-C receiver.

Croatia (29-09-05)

Test operation of DVB-T system has started in May 2002. Equipment for two transmitter sites has been installed by the Croatian national television (HRT) and is now operated by OiV (Transmitters & Communications) which formed from HRT transmission department.

Two transmitters are operating in the area of Zagreb, with approximately 800 000 inhabitants. A concept of the lower adjacent channel operation of DVB-T station with 23dB ERP difference has proved to be feasible in practice.

In the second quarter of 2005, DVB-T transmitter in the area of Istria and town Rijeka has been put into operation.

The objective is to test different modes of operation, maximum number of programs within a multiplex, SFN concept, and to obtain an estimation of protection ratios digital-analogue and digital-digital based on live measurements.

The aim is to achieve 75% of total coverage for one multiplex in the country, by the middle of 2006.

Presently, there are no free channels available to plan national - wide digital coverage with high power transmitters, largely due to the introduction of the fourth analogue network with national coverage, so further coordination and phasing out of analogue TV will be necessary.

It is foreseen that the future digital network will operate as MFN/SFN network.

The government has not yet announced official documents regarding introduction of DVB-T, switch off date for analogue service and licensing policy.

Czech Republic (06-10-05)

Licences for two experimental projects were issued in 1999 (one for an SFN with 3 transmitters and the second for an SFN with 2 transmitters), both of them in the Prague region. These licenses are prolonged until end of 2004. Czech Television as the public broadcaster is participating on both projects.

Tx site	Channel	ERP_{max} (kW)	Remarks	Operator
Praha – mesto	25	1.25 – 5	Adjacent to 24 Adjacent to 26	Czech Radiocommunications
Praha - Cukrak	25	5		
Praha – Strahov	46	10	Local SFN for indoor portable reception in the large city testing.	Czech Digital Group
Praha – Ladvi	46	5		
Praha – Z. Pruh	46	4		

The Council for Broadcasting has issued the Conception of DVB-T introduction in the Czech Republic.

The Czech Government has adopted a decision concerning DVB-T introduction. Entirely new legislation dealing with electronic media and broadcasting is being prepared. Due to the delay with the new legislation the start of DVB-T was postponed and it is foreseen in 2004.

The Digital Broadcasting Group (SDV), established by the Council for Broadcasting, is co-ordinating activities concerning introduction of DVB-T.

Denmark (29-09-05)

It has been decided by the parliament that the international co-ordination of 4 DVB-T multiplexes should be initiated. The co-ordination is in progress. Co-ordination of the channels for the first 3 multiplexes is almost finalised.

One of the four DVB-T multiplexes will provide for a regional structure equal to the analogue network used by TV 2/DANMARK.

In general pairs of main stations will form SFNs.

Initially 8k, 64QAM, Code rate 2/3 and a Guard interval of 1/4 will be used providing 4 - 5 programmes in a multiplex.

Test transmissions with two high power stations (e.r.p. 50 kW) working in SFN started in November 1999, an SFN gap-filler (e.r.p. 35 Watt) has been added in September 2000 serving central parts of Copenhagen. Two high power stations started operation in October 2002 in Northern Jutland.

The two national public service broadcasters have received the permission to establish a transmitter network for the first multiplex, which they will share.

The first multiplex will start on 1 July 2005 with nationwide coverage. This multiplex will carry programmes and interactive services from the public service broadcasters, DR and TV2. All services will be transmitted unencrypted

Estonia (27-09-05)

In 30.08.2002 8 countries (including Estonia) which did not get assignments in the frequency band 790 to 862 MHz in the initial ST 61 plan signed “Regional Multilateral Coordination Agreement for DVB-T in TV channels 61-69” which entered into force on 01.01.2003. According to Agreement Estonia has 6 allotments forming one national coverage.

The Government of Estonia has approved the experimental transmission of DVB-T with one transmitter at Tallinn (capital of Estonia) which started in December 2003. Digital transmission of 4 programs and additional services started at 07.05.2004. Number of households using the service is approximately 1000 (as of December 2004). In October 2005 SFN trials in Tallinn will start.

Cabinet of Estonia considered at 15.06.2004 “Conception of Introducing Digital Broadcasting in

Estonia" which was drafted by working group of interested parties in the lead of Ministry of Economic Affairs and Communication. A new working group of experts will draft necessary changes in national legislation and enhanced Broadcasting Act will be forwarded to Cabinet of Estonia next year (2006).

During preparations for RRC06 draft Plan Estonia has developed preliminary DVB-T plan consisting of 9 multiplexes. This plan has to be yet coordinated with neighbouring countries.

Finland (03-10-05)

The Ministry of Transportation and Communications granted the licenses for 3 multiplexes in Finland 23.6.1999. One multiplex was given to the Finnish Broadcasting Company and the other two to commercial companies. The licenses were given for 10 years beginning from 1.9.2000. At the same time it was preliminarily decided that the analogue TV-services will be closed at the end of year 2006. Later in 2004 the switch-over date was officially confirmed to be 31.8.2007.

Operational transmissions (using 8k, 64QAM, code rate 2/3 and guard interval 1/8) started as scheduled 1.9.2000 covering around 39% of the population. However, the major launch of DVB-T services was postponed till 27.8.2001 due to the delay in finalising the MHP standard – the one officially chosen by Finland.

During the fist quarter of 2004 set top boxes were selling faster than any other household appliance has ever sold in Finland – including the GSM phones and colour TV sets in the past.

In 2005 a DVB-H pilot test was started in the Helsinki area. As part of the pilot, 500 handheld Nokia 7710 receivers capable of receiving DVB-H transmissions were borrowed to volunteers randomly selected from subscribers of major GSM operators. The experience to be gathered during the pilot will be used when awarding the licences for DVB-H in Finland.

France (25-02-2005)

The Digital Terrestrial TV service (TNT) started in France on the 31st of March 2005 and covers approximately 35 % of the French population. This coverage will be extended to 50 % of the population from September 2005 then gradually to cover between 80 and 85 % of the population in 2007. 19 new sites in beginning of 2006 and 24 others sites in the end of 2006 will be opened. Pay TV will be launched between end of September 2005 and March 2006.

The objective is to allow all the French households to reach an offer of digital television. That is why a reflection was started within a working-group which associates all the institutional and economic actors concerned in order to estimate the various possibilities of reaching quickly this purpose.

At present, approximately two thirds of the French households use terrestrial TV as main mode of reception of television: the migration towards the digital thus has to take into account the importance of the number of concerned homes.

The 13th of September, CSA authorised experiments of T-DMB and DVB-H over Paris for 9 months. They are launched in order to test the technical aspects, the use and the contents with the consumers as well as to identify and test the relevant economic models.

Four groups of companies are concerned by these licenses for 9 months:

- A consortium coordinated by TDF for half of the capacity of the canal 37 for broadcasting DVB-H;

- A consortium coordinated by TPS of the other half of the canal 37, in DVB-H also;
- The third consortium, coordinated by Canal +, has on the canal 29 of a capacity equivalent to each of the precedents, in DVB-H, for the same period;
- Finally, the fourth consortium, established by TF1 and VDL, will use a VHF channel for an experiment in T-DMB of duration of six months, beginning on October 15th, 2005.

These four groupings were authorized to broadcast a set of programs of radio or television having been already the object of agreements with the council. In the eventuality where new programs would be created for these tests, they will beforehand have to receive the approval of the council.

Germany (29-09-2005)

In summer 2000 the government of Germany concluded the paper "Initiative for Digital Broadcasting" elaborated under the head of the former Federal Ministry of Economics and Technology. This Initiative reflects the consensus and the aim of all interested and important parties to the introduction of digital broadcasting services including regulatory and technical aspects. Based on the German Telecommunications Act amended in 2003 analogue television transmission will have to be cease in 2010 at latest. The detailed switch-off dates for the analogue television services in different geographical areas are closed related to the results of the ITU RRC-06 regarding the new digital Plan and its agreement as well as to successful arrangements on a bi- and multilateral basis reached with neighbouring administrations.

The long-term aim for DVB-T is to provide portable indoor reception and possibly mobile reception for nation-wide, regional, sub-regional and local coverage. For urban areas the portable indoor reception mode with 95% location probability and for rural areas the portable indoor reception mode with 70% location probability are planned. It has been investigated that the consideration of these fundamental criteria is essential for a successful introduction of DVB-T on the market.

First of all, the regular DVB-T transmissions will start respectively have been started with about three to four multiplexes in big cities and other areas with high density of population using frequencies in band IV/V including the channels above 60. Later, the transmissions will be extended to the whole country step-by-step, additionally the number of multiplexes may be increased depending on coverage requirements. Within a short transition period from a couple of months up to about two years depending on different regulatory and technical constraints the programme distribution of the analogue and the digital services will be in parallel in the areas concerned. After this transition period all analogue transmissions will end in these areas.

The all-digital scenario is mainly based on a SFN planning. The 16 QAM-2/3 variant is favoured using an 8k system.

After some years of experiences made by test transmissions based on pilot projects in several areas the legal launch for DVB-T operation in Germany took place in Berlin and surrounding areas on 31st October 2002 using two multiplexes. The transmissions started with two SFN each with two transmitters using the channels 44 and 5 respectively. Since August 2003 five additional multiplexes using the channels 7, 25, 27, 33 and 56 are in operation, each of them is transmitted by an SFN with two or three transmitters. Whilst the former analogue programme distribution on the channels 5, 25 and 44 was ceased a short simulcast phase regarding the former analogue programme distribution on the channels 7, 27 and 33 took place. During this simulcast phase the concerned analogue programmes were mainly distributed on alternative channels using less radiated power. In autumn 2003 all analogue TV stations in the Berlin area originally used for analogue transmissions were switched off. The seven digital multiplexes contain 12 public programmes and 14 commercial programmes.

On May 24th 2004 three additional regions followed this way of legal DVB-T introduction with four multiplexes. Now in the areas of Cologne/Bonn, Bremen and Hannover/Brunswick 16 to 20 TV programmes are delivered using 13 single frequency networks with a total of 45 DVB-T transmitters.

This process of introduction of DVB-T continued in autumn 2004 in the areas of Frankfurt/Main, the Ruhr District (which consists of the cities of Düsseldorf, Essen, Dortmund), Hamburg, Lübeck and Kiel.

Like in Berlin all analogue TV-transmitters in the areas mentioned above will be switched off after a short simulcast phase of a maximum of 6 months. In Frankfurt/Main the simulcast phase will be reduced even to only two months.

Furthermore in Bavaria the operation of six DVB-T multiplexes has started on 30th May 2005 in the areas around Munich/South Bavaria and Nuremberg. The simulcast phase will be limited to 3 month.

In autumn 2005 the areas of Erfurt/Weimar and Halle/Leipzig will follow.

These networks are planned, co-ordinated and implemented by converting existing analogue high-power assignments into digital allotments.

More than 45 million people will then be able to receive DVB-T via a roof-top antenna (fixed reception), corresponding to 55% of the population, and about 18 million people could have portable indoor reception (22% of the population). By the end of 2005 more than 3 million receivers were sold.

Further up-to-date information on the implementation of DVB-T in Germany is also available on the internet (http://www.ueberallfernsehen.de).

Greece (10-06-03)

The Greek Administration began with the planning of DVB-T last year. Our priority is to cover the area of ATTIKI in which there is the capital of Greece, Athens. This area includes almost the 50% of Greek population, so it is from main importance to cover this area first.

We intend to use a combination of Single Frequency Networks and Multi Frequency Networks in our planning because of the geographical characteristics of the area. This first planning for ATTIKI will constitute a pilot project for the rest of the country.

Hungary (06-10-05)

The Hungarian DVB-T plan was prepared in 2000 and the co-ordination procedure is continuing. The plan consists of three multiplexes using 17 existing and three new main station sites. The channels of the three MFN networks are in the 478-862 MHz frequency band.

We consider that 7 DVB-T multiplexes in the UHF and 1 DVB-T multiplex in the VHF band will be needed in the future.

Test transmissions with four transmitters (two with 1 kW and two with 100 W) have been working in Budapest area and one (with 2 kW) in the western part of the country.

Decision regarding the implementation of DVB-T is under consideration by the Government.

Preliminary view is that DVB-T service will start in 2007.

Ireland (26-09-05)

In 1998 the Office of the Director of Telecommunications Regulation (ODTR) studied the potential for TV delivery services in the Digital era.

The Broadcasting Act 2001 subsequently set out the legislative framework for Digital Television in Ireland. Applications were sought by the Minister for the Digital Multiplex Licence by August 2001, however there was only one applicant. That applicant withdrew their application, but the legislation remains on the statute books.

For the future, the Irish Government seeks to facilitate the development of a substantial universal and free to-air offering of nationally broadcast programming on digital television platforms in the medium term. The availability of the national channels on a free-to-air digital basis is a key policy objective.

Whilst the use of interactivity within Digital Television on all platforms is of interest to Ireland, questions remain as to what services would be offered and how they would be licensed. ComReg is of the view that “In-Band” return channels would operate on a non protected, non interfering basis. The use of DVB-H equipment for portable reception is being considered.

More than 30% of television households have digital satellite television. Cable penetration is as high as 80% of homes passed for some cable networks, over 6% have digital cable television. However, it is uncertain when DTT will launch, such a launch might not be until after the RRC. Ireland has not yet proposed a specific date for when full digital switchover will have occurred and analogue switch-off can happen. In proposing such a date, Ireland will seek to identify a point in the future at which:

i)The coverage of free-to-air digitally broadcast national television in Ireland is likely to be sufficiently high and nearing universality.

ii)Analogue switch-off will be expected to result in a minimum of inconvenience to viewers.

While spectrum is viewed as a vital national resource and is carefully monitored in terms of its usage, there may not be the same level of demand on spectrum in Ireland that occurs in other countries. For this reason, analogue switch-off in Ireland may not be the priority it is in other countries where demands for spectrum usage may be extremely high.

In DTT, transition period planning for the 12 main stations, 18 major transposer stations and a further 14 transposer stations is complete. Co-ordination discussions relating to the RRC06 inputs at these sites are almost completed. It is likely that the new plan for the bands at RRC-06 will be established before formal DTT services commence. However the Government Department have sought tenders for provision of equipment for trials.

In December 2002 the ODTR was replaced by the Commission for Communications Regulation (ComReg) (www.comreg.ie)

Planning is taking place in preparation for the submission of input requirements to the RRC06 process. Even when planning in general for fixed networks, it is expected that portable reception will be available in the urban areas.

Italy (04-10-05)

In 1999 the Italian Communication Authority set up a DTT National Committee, i.e. a Forum bringing together broadcasters, network operators, industry, universities and R&D institutes. The results of the work, carried out by four Study Groups on service requirements, network and frequency planning, architectural and costs evaluation, planning of the launching phase, are reported in the White Book published in September 2000 and submitted by the Italian

Communication Authority to the Parliament.

The White Book also argues for financial incentives for local broadcasters to liberate frequencies. The main national broadcasters are Rai, Mediaset, Prima TV, Home Shopping Europe, Rete A, La7, Mtv, Rete Capri, Elefante Telemarket ecc..

Furthemore the Italian Parliament approved a law, which envisages the complete transition from analogue to digital terrestrial television by the end of 2006. According to this law the Italian Communication Authority elaborated and published at beginning of February 2003 the plan for digital television broadcasting named planning of first level; at beginning of January 2004 the Italian Communication Authority elaborated and published the plan for digital television broadcasting named planning of second level.

Under the co-ordination of the Ministry of Communications, a number of pre-operating activities are being undertaken by the public and some private Italian broadcasters in all Italian territory.

From the side of RAI, at the moment, more than 140 DVB-T transmitters are operating in the greater Italian cities: more than 30 DVB-T transmitters are operating in Band III and about 110 DVB-T transmitters are operating in Band IV and in Band V two multiplex are radiated, covering more than 70% population. In addition some new DVB-T transmitters, including some mini-SFN, are going to be operational in few months. The development of EPG, super-teletext and interactive advertising applications is ongoing, based on the DVB-MHP open API platform. Furthermore, T-government applications (information regarding Public Administrations, payment of taxes, retirement funds) are being developed in the framework of the DTT Commission, under the auspices of the Communication Ministry.

A datacasting multimedia application based on DVB-T technique has been performed in the area of Rome and Turin.

In the RAI Turin DTT pilot trials, the programme content is diversified in order to meet two basic technical and commercial requirements: the feasibility of terrestrial services oriented to portable and mobile reception, the introduction of a new diversified and enriched offer (TV programming, interactivity, radio, multimedia etc.) in order to make DTT successful in the competition with the already established satellite services.

MEDIASET is strongly committed in experiments on DVB-T systems to accelerate the introduction of digital terrestrial television. MEDIASET has more than 100 DVB-T transmitters operating and covers a significant percentage of the Italian population with one multiplex. All these transmitters are obtained from conversion from existing analogue ones. A similar number of digital transmitters is also planned in the near future, to further enlarge the coverage. The existing multiplex includes MHP interactive applications.

Also the work to check interoperability of MHP applications and to evaluate the interest of the audience about the new interactive services is going on.

Also other national networks of the list above are operating with a lot of DVB-T transmitters, moreover there're other stations that are operating on local/regional area with a small number of DVB-T transmitters for each broadcaster and they are using low power transmitters.

Therefore, in some areas also 4 or even 5 multiplex are available.

However there are also time sharing analogue (day) / digital (night) experimental trials carried out by many broadcasters.

In the near future it is expected that a lot of transmitters will be operating in the same way.

Latvia (06-10-2005)

Network planning, based on 8k 64QAM 2/3 modulation mode for fixed antenna reception in rural areas and portable in urban areas, was initiated in 1998. Frequency planning is based on use of SFNs of average size approximately 100 by 100 km for national and regional coverage.

As a step in the preparation for the RRC-04/06 Latvia signed in August 2002 a multilateral coordination agreement for DVB-T in TV channels 61-69 (Nida, 2002) an actually participates in all regional and ITU activities for preparation of input requirements to the Regional radiocommunication conference RRC-06.

Test transmissions in Riga started on March 2002. A transmitter in the Band V transmitting 4 programmes is used. Preparations are going on to start in the central region of Latvia regular transmissions using an increased number of coverages.

Approval by government of a conception for introduction of digital broadcasting is expected.

Lithuania (06-10-05)

The planning and frequency co-ordination for DVB-T is going on. For transitional period 4 national multiplexes were planned and their international co-ordination was initiated in August 1998. They will work in parallel with analogue networks and will repeat their programmes. During coordination process these networks were heavily modified, but at this time they are close to be completely coordinated.

For the transitional period networks are planned for fixed reception and will use SFN and MFN networks with the 8 K system.

The government made decision to start DVB-T transmissions of the national television channel. Few years ago permission was issued for Lithuanian national operator to start test transmissions in the capital of Lithuania – Vilnius using channel 53. At the current time these test transmissions are already on air for about one year. Both national broadcaster programmes are simulcasted through this test transmitter. Licenses were issued on 31-03-04 for three broadcasting companies to allow transmitting their own programmes through this transmitter. According to the licences these transmissions should start not later than on 01-09-04. From that time this transmitter will leave its current test status and will begin to work on commercial basis. Therefore at that time there should be a total of 5 programmes (3 commercial and 2 national) transmitted through it. One out of 3 commercial programmes is currently only available via cable networks in some areas, other 2 are broadcasted terrestrially.

A model covering technical and legislative questions for introduction of digital television in Lithuania is being developed and should be accepted by the government in the near future. Currently it is expected to have commercial transmissions on 4 channels carrying around 20 programmes by the end of 2005 in Vilnius. Two other largest cities – Klaipeda and Kaunas should be covered by the same multiplexes by the end of 2006. Some other big cities are expected to be covered by the end of 2007. After that all territory of the Republic of Lithuania should be covered by 4 multiplexes in the next two years.

Luxembourg (06-10-05)

Since 2002, 3 test transmitters have been put into service on channel 41 in a SFN network for experimental operation, covering Luxembourg city and surroundings as well as the south-west of Luxembourg. As there is a very high cable penetration, Luxembourg is planning networks with portable indoor reception.

Field-tests with fixed, portable and mobile reception have been carried out in the SFN configuration

to test different mode of operation and in particular the SFN concept. The final operation mode is 16 QAM, 2/3 code rate, 1/8 guard interval and using 8k.

Interactive and data services will also be considered in the future as well as DVB-H.

In addition, the analogue CH7 has been switched off end of 2004 and is now running in a test phase in digital mode carrying one test programme.

It is the aim of Luxembourg through mutlilateral coordiantion meetings with neighbouring countries to coordinate 7 nationwide multiplexes (layers), among them 3 are switched over from analogue to digital and are high power transmitters.

Luxembourg considers that is very important that coverage spill over the boarder regions of CEPT Member States will be preserved in the digital world in order to allow continued reception of free to air broadcasting from neighbouring states.

An offical introduction of DVB-T has not yet been announced.

Luxembourg has no direct switch off plan, but will let the market to decide.

Malta (23-09-05)

In 2004, the Malta Communications Authority (MCA) together with the Ministry for Competitiveness and Communications carried out a study on the introduction of digital terrestrial television services. A consultation paper was published and Government's strategy on the matter was subsequently published.

In March 2005 an invitation to participate in a process leading to the assignment of radio frequencies to set up two digital terrestrial television networks was published. This led to the awarding of two spectrum licenses to two operators.

In July 2005, one of the licensed operators started providing services, however, with limited coverage. However, it is expected that additional transmitters will be set out to cover the whole territory.

Frequency coordination for all transmitting sites is still in progress. Both networks will be Single Frequency (SFN), based on 8K mode and a Fixed-type of reception.

Moldova (14-10-03)

In September 2003 test transmissions started with a single DVB-T transmitter. In October 2003 the second transmitter started test transmissions with 4 programs.

Netherlands (06-10-05)

On the 31st of January 2002 the State Secretary for transport, public works and water management, granted the licenses for use of frequency space for digital terrestrial television. The public license is given to the NOS, an organisation in the Netherlands which now exploits analogue public television (one multiplex). The license for commercial purposes is given to Digitenne Holding (four multiplexes).

The licenses are given on a basis of NIB (Non Interference Basis). The reason is that co-ordination is not ready for all the surrounding countries of the Netherlands. The licenses are given for a period of 15 years ending at 31.12.2016.

Digitenne and NOS started together in April 2003 with regular digital commercial transmissions in part of the so-called Randstad area and they are now in a stadium to finalise the roll-out of the 5

multiplexes in the complete Randstad.

Digital Switch-over

A government appointed advising commission proposed that a switch off should be realised around 2007, provided that some necessary conditions are fulfilled at that time.

Public broadcasters study now in detail how the transition to digital could take place in the fastest way together with the roll-out of the commercial network. There is a proposal to switch-over on a region by region basis without a simulcast period.

Norway (06-10-05)

The basic frequency planning and co-ordination for three multiplexes with national coverage is finalised. When DTT will be officially launched to the public there will be frequencies for the distribution of three multiplexes.

The network planning is mainly based on multi-frequency networks (MFN), but there will be some single-frequency networks (SFN) used for limited areas. Both MFNs and SFNs are based on the 8 K mode.

Introduction of more multiplexes can not be done before the channels 61-69 have been freed-up for broadcasting services, or the shutdown of analogue services in the UHF channels has begun. Four more multiplexes with national coverage have been planned together with Sweden, Denmark and Finland. These multiplexes are not coordinated, but they will form the basis for our requirements in the UHF-band for the RRC-06.

Norkring, the main Norwegian network operator agency, was awarded a licence for starting DTT test transmissions of two multiplexes in Oslo and Bergen and one multiplex in Trondheim from June 2000. These 5 transmitters gives DTT coverage to 30 % of the population.

Poland (27-09-05)

Since the 4th of May 2005 Poland has had ***Broadcasting switchover strategy for terrestrial television***, which is an official governmental document containing the scenario of the transition period. It is the effect of works of the Governmental Committee appointed by Prime Minister in January 2004. Before being adopted this document was a subject of public discussion between the actors of broadcasting market.

The main points of this strategy have been determined as follows:

- The DVB-T system will be launched in Poland as a standard in force.
- The existing analogue programme offer (7 channels) should be protected on every stage of implementation – at least two multiplexes needed
- The forced transition model (island by island) is a unique mode to effectively implement DTT in Poland. The borders of each island overlap the borders of voivodeship (administrative unit)
- For the economical reasons, it is recommended to establish a period of simulcast analogue and digital broadcasting as short as possible (for example 12 months - it will be decided on the basis of experiences of pilot project in the first islands)
- The decision about the switch off of the analogue TV within the island may be taken after the achievement of the 95% of availability and 90% of affordability at the same time.
- After the analogue switch off within the island the digital conversion of high power transmission stations currently used for analogue broadcasting should take place. It will contribute to the enrichment of a digital programme offer.

- A 10-year-period of realizing the strategy is forecast. It means that the total switch off of analogue TV will be expected by the end of 2014.

The preparation of the strategy in its social and market aspects will be continued and its realization constantly observed and corrected.

The first stage of implementation was provided in the end of this year. Unfortunately it will be delayed because of an ongoing discussion on the possible implementation of MPEG 4 standard. The problem is very difficult to solve due to several factors which must be taken into account.

Independently of the activities described above, several DVB-T test transmissions have been operated. The first one initiated by Polish DVB-T Forum started in Warsaw in 2001 and another one a year later in Wroclaw. There are typical technical tests provided to assess coverage, interference, quality of reception as well as to check the possibility of statistical multiplexing and to demonstrate the features of interactive TV.
The difficulties in achieving the region-wide coverage for regional TV programmes persuaded the Management of public TV to put in operation three digital transmitters in Rzeszów, Lezajsk and Wisła in the south part of country. The experiences after a year of this experiment are very promising from the point of view of new technology's social acceptance.

Two commercial broadcasters (Polsat and TVN) are planning to put in operation the test transmission in MPEG 4 standard.

Another interesting experience resulted from launching the digital television in Berlin in 2003. The inhabitants of west region of Poland, near to the German border, have a good quality and stable reception of DTT programmes. The start of Polish DTT is impatiently expected there.

Portugal (06-10-05)

The preparations for introducing DVB-T in Portugal had started by Spring 1998 at an official level as well as the beginning of the co-ordination process with our neighbouring country, Spain.

As a result of co-ordination between Portugal and Spain a bilateral plan was agreed, being composed in the first stage by four coverages on a national level, three SFNs and one SFN (MFNs) in the Portugal mainland. The chosen channels are located in the upper part of band V.

In the meantime, from 2 June 1998 until 2000, the Portuguese network operator Portugal Telecom implemented an experimental DVB-T network in the Lisbon area. The main characteristics of this network were composed by a SFN (8k, 64-QAM, 2/3 code rate and 1/4 guard interval) with 3 transmitters (2 kW, 1 kW and 500 W) operating in channel 64. Four television programs were broadcasted in simulcast with the 4 existing analogue programs. This SFN was considered by the manufacturers as the first worldwide successful SFN and among other demonstrations, e.g. in Expo-98 and ExpoTelecom 99, it was possible to observe successful demonstration of fixed and portable reception, besides the development of field trials and implementation studies for different code rates and powers.

In 17-18 February 2000, an International Conference on DVB-T was convened in Lisbon, as part of the Portuguese Presidency of the Council of the European Union, with the aim of defining the guiding principles for the introduction of DVB-T in the EU countries. The conclusions emerged from the Conference are reported in Addendum to Document CEPT/FM-PT24 (00)27.

Following the Conference a new strategic plan for the introduction of DVB-T in Portugal was prepared and an official approval from the Government was received by the end of year 2000. This approval provided the basis for the launching of an international tender which took place during the second quarter of year 2001.

The result of the beauty contest, which was run from June to August 2001, was finally known and the winner consortium was announced by the Government at the end of August 2001, so-called PTDP. The operating license was formally granted in October 2001. PTDP will explore the capacity of four multiplexes, being foreseen the starting of the DVB-T service during the first half of 2003.

Since PTDP did not start the DVB-T service until the first of March 2003, the granted license was revoked by Order of the Minister for the Economy of 25 March 2003.

This led to further studies in order to find a new business model more suitable to the Portuguese TV market. This business model is not yet defined.

Romania (16-09-03)

In the year 2000, the Ministry of Communications and Informations Technology of Romania approved a DVB-T plan obtained by conversion of unused ST61 assignments, providing one national coverage. This plan is in the coordination process with neighbouring countries. In the near future the public operator, National Broadcasting Society, intends to start a test transmission of DVB-T in Bucharest with two transmitters in an SFN configuration

Russian Federation (06-10-05)

5 DVB-T transmitters are working at present time, and one more will be launched in nearest future. All of them have experimental status and used for investigations of compatibility between DVB-T and analogue (SECAM-K) television broadcasting, but also proposed to be full-functional DVB-T services.

Transition from analog to digital TV in the Russian Federation at the first stage assumes the replacement of an analog signal into digital one with preservation of the existing standard of decomposition of a signal. Such signal can be reproduced not only by color TV set, but also by black-and-white TV set having a special receiver box.

In Russia before the introduction of digital TV it is required to carry out an experimental broadcasting. In connection to this there were organized experimental broadcasting areas in Moscow – 32, 34 TVch; Saint-Petersburg – 34 TVch; Nizhniy Novgorod – 50 TVch; Vladivostok – 51 TVch; Chelyabinsk – 30 TVch.

The broadcasting is conducted in standard of DVB-T and the following types of modulations are used:

4 FM, Mode 8K, rate 7,81 Mbps;
16 QAM, Mode 8K, rate 15,61 Mbps;
64 QAM, mode 8K, rate 23,42 Mbps.

Now researches of an opportunity of interactive reception on mobile television receivers with the liquid crystal display are conducted, the return channel is planned to realize through GSM network.

In Moscow since February, 1, 2002 experiments on the use of standard DVB-T for high-speed transfer of digital streams and access to the Internet in 34 TVch are carried out.

In the Russian Federation works on creation of the professional equipment for digital broadcasting are practically completed.

At the same time radio and cable receiver boxes for the reception of digital TV are developed. Now the hybrid TV sets are developed.

For the further introduction of digital TV broadcasting a planning of DVB-T frequency assignments, both in European Broadcasting Area and to the west from longitude 170ºE is carried out. Now the

majority of planned frequency assignments to DVB-T stations is coordinated with other Administrations, 37 frequency assignments are included in the Plan (Stockholm, 1961), 4 frequency assignments are included in MIFR.

Furthermore 24 frequency assignments to DVB-T stations are coordinated and in the near future will be included in the Plan (Stockholm - 61) and in Lists of existing and planned TV stations for the territories of extended planning area.

Slovak Republic (04-10-05)

In the 3rd quarter of 2004 two pilot projects were put into operation (Banská Bystrica + Zvolen, i.e. in the mountainous area and Kosice + Presov, i.e. for the second biggest Slovakian city's area) with 3 transmitters in total. Third pilot project for the capitol Bratislava will be put into operation soon.

The pilot project operation will finish in June 2006. That's why it is assumed that the regular transmission will start on 1st July 2006. According to the Ministry's of Transport, Posts and Telecommunications announcement sent to the EC, the analogue broadcasting should be switched off in 2012.

The co-ordination of frequencies with all neighbours is in progress. The intended transmitters should completely cover the territory of Slovakia with two multiplexes (for some cities and towns one additional frequency has been computed) in the first stage of DVB-T implementation.

The progress of DVB-T is supported by the Ministry of Transport, Posts and Telecommunications.

Slovenia (06-10-05)

A study has been made and it is proposed to plan 6 multiplexes in the 470 – 862 MHz band and one multiplex in VHF Band III. After the analog networks will cease the following usage of the multiplexes is planned:

- One national SFN for coverage of 95% of the population,
- Three national networks consisted of a mixture of MFNs and regional SFNs for coverage of at least 80% of the population,
- Two MFNs or SFNs are planned in every regional area for regional programs
- Six small networks (diameter approximately 25km) consisted of a mixture of MFNs (reuse of the same channel as much as possible) and SFNs in VHF Band III for mobile reception in " hot spot " areas in the beginning
- Some local transmitters.

For both MFNs and SFNs 64 QAM 8k system is favored. For mobile reception QPSK system probably will be used. The long-term aim is to transfer as many MFNs as possible to SFNs and to ensure portable indoor and possibly mobile reception for the whole population. No decisions have been made on the timing to shutdown the analog transmitters. The introduction of DVB-T will probably be possible in 2006. Public broadcaster started in year 2000 with DVB-T test transmissions (medium power transmitter on channel 37) to cover the capital city of Slovenia – Ljubljana with its surroundings. The service areas of the SFN networks are planned to cover " hot spot " areas.

Regarding DVB-H transmission Slovenia had a trial in Radenci (north-eastern part of Slovenia). DVB-T and DVB-H were transmitted simultaneously on the 32. channel in hierarchically mode.

Receivers were handhelds and they worked properly when they were close to the transmitter of 10 W of ERP.

The legislation concerning DVB-T is expected to be prepared at the end of this year.
Second session of the RRC-06 conference will be here soon so process of coordination on bilateral and multilateral basis still goes on.

Spain

The Spanish Administration is believed to be at the point of issuing DTT regulations. The networks are likely to include national, regional and local coverage using SFNs for national reach and multiple SFNs for the regional areas. Regulators have been lobbied by broadcasters to accept their views that there is no role for free-to-air programming in DTT.

The plans are expected to require setting up networks by the end of 1998, which is a very aggressive time-scale. A commercial receiver platform is also expected in that time. Analogue broadcasting licences will be renewed in 1999 on condition that services are also simulcast in DTT, and switch-off is planned for 2010. Cable installation licences are also being awarded. There is plenty of competition in platforms in Spain, with two satellite services also on offer.

Sweden (04-10-05)

On the 1st of April 1999 digital terrestrial television was officially launched in Sweden. The network plan consists of a mixture of MFNs and regional SFNs in order to make the most efficient use of the available spectrum and to ease co-ordination. Four multiplexes covering 90% and a fifth multiplex covering 50% of the population are currently in operation. An increase of the coverage of four multiplexes to 98% are now being prepared. The awarded licences offer a mixture of national and regional services, including all major commercial Swedish television channels. The available programs are partly free-to-air and partly pay-tv.

In May 2003 the Swedish Parliament decided that analogue television broadcasting in Sweden will be switched off by the 1 February 2008 at the latest. Terrestrial television will then be all digital. The switch-off will be realised in steps. The digital coverage should be 99,8% for the Public service multiplex and at least 98% for a second multiplex. Additional multiplexes should have a coverage based on market demand. A committee appointed by the Government will monitor the switch-over process and provide information to the general public. In June 2005 the Government decided on the complete switch-off plan for analogue television. The first region to switch-off was Gotland where the analogue service was closed down on September 19 2005. The next areas to be closed down are Gävle and Motala. to be completed by November 21 2005.

The areas represent 3,5% of the households in Sweden. The second stage in the close down process will start on 27 February 2006 and be completed 2 May 2006. This stage will cover 22% of households. The third stage will take place on November 6 2006 and cover an additional 17 % of households. The fourth stage will take place during the period 12 March to 14 May 2007. During this stage which covers 26 % of households the analogue service in the capital Stockholm will be closed down. The final stage, covering 31, 5% of households will take place between 2 September 2007 and 15 October 2007.

In order to meet the coverage requirements for the public service network, 99, 8 %, it is expected that a large number of gap fillers will have to be converted from analogue to digital.

Switzerland (29-09-05)

Thanks to the high cable penetration and the possibility to receive all Swiss public TV-programs via satellite it was possible to cease a part of the completely occupied analogue frequency spectrum.

Two analogue TV-chains that have been used for the language exchange have partly been switch-off by mid 2002 (in total 769 transmitters).

A Swiss migration strategy is based on a two-step approach:

- In the transition period the released analogue frequencies will partly be used to establish two digital MFN networks. Although 769 transmitters have been switched-off additional frequencies are needed during the simulcast period to realize the two national digital coverages. The simulcast has been shortened to 2-3 years.
- In a second phase (following the Regional Radio Conference) the existing Multi-Frequency-Networks should as far as possible be converted into SFN coverages. The remaining analogue networks will be switched off and will be replaced by new digital coverages. In the all digital future Switzerland intends to operate at least 6 to 7 DVB-T/DVB-H (in UHF only) and 6 to 7 T-DAB coverages.

At present 127 DVB-T transmitters are in operation:

- In the Wallis valley an existing private analogue TV-transmitter network has been converted according to Chester 97 into a DVB-T network. 88 DVB-T transmitters, distributing 4 multiplexes (MFN, stationary outdoor reception) are in operation.
- In November 2001 the Swiss Broadcasting Corporation launched its first DVB-T network in the eastern part of Switzerland (3 SFN-transmitters in a mountainous area, 1 MUX). That network has been extended in 2003 by two additional MFN-sites.
- The public broadcaster has realized its second DVB-T network in the southern part of Switzerland, in the canton Tessin. This network, consisting of 11 sites operating as an MFN, has been switched on in August 2003 (1 MUX, planned for portable outdoor reception).
- In June 2005 the DVB-T network in the “Bassin Lémanique” (area of Geneva and Lausanne) has been put into operation (5 transmitters).
- A private DVB-T network (4 MUX), intended for stationary outdoor-reception, is planned in the eastern part of Switzerland. This network is as well located in a mountainous area in the canton Graubünden. Eighteen stations of that network are already in operation.

Turkey (28-04-99)

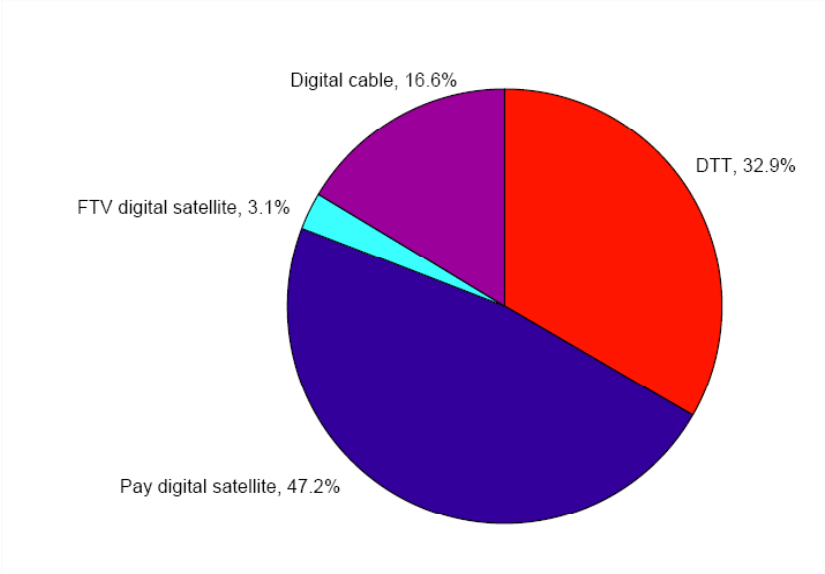
In Turkey, the Terrestrial Digital Broadcasting studies for both DVB-T and T-DAB have been started at the same time. Today, the concerning Administrations are preparing a concept which will include national broadcasting strategy and the timing of analogue shutdown. After this study, a plan will be developed for introduction of DVB-T.

United Kingdom (01-10-2005)

Digital Television Uptake

As of 30 June 2005, digital TV penetration was estimated to have reached 63% (15.7 million) UK households, up from 61.9% at 31 March 2005. Figures for the individual platforms are given below:

- Digital cable (ntl & Telewest) - 2.60 million
- Digital pay satellite (Sky) - 7.42 million
- Digital pay ADSL - 0.02 million
- Digital free-to-view satellite - 0.49 million
- Digital terrestrial (Freeview) - 5.18 million



DTT adapter boxes are available from around £30 (Euros 45) from a wide variety of manufacturers. Also DTT hard-disc recorders are available from an increasing number of manufacturers.

Digital Switchover

The UK government has announced that digital switchover will happen between 2008 and 2012 by ITV region in the following order:

2008 – Border
2009 – West Country, HTV Wales, Granada
2010 – HTV West, Grampian, Scottish Television
2011 – Yorkshire, Anglia, Central
2012 – Meridian, Carlton/LWT (London), Tyne Tees, Ulster

See http://www.digitaltelevision.gov.uk/ for details.

The Government wants all UK households to benefit from digital TV. Key to this is ensuring that everyone has a choice of digital TV options that they can afford. This can only be achieved through a universal switchover from analogue to digital signals.

A support scheme will be available to make sure that no one is left behind in the switch. It will provide help with equipment and installation and follow-up support for people aged 75 years and over and people with significant disabilities. The scheme will be funded by the BBC through the licence fee.

A new body “SwitchCo” has been set up to deal with the implementation of digital switchover. SwitchCo is made up of the broadcasters, TV retailers and manufacturers, and is independent of government and Ofcom. See http://www.digitaluk.co.uk for details.